



City of Charlotte

Engineering & Property Management Landscape Management Division

2017 Landscape Construction Standards

Landscape Construction Standards to be
used on all city-funded construction
(Capital Improvement and/or Maintenance Funding).



City of Charlotte
Landscape Management
living life green

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STANDARD SPECIFICATIONS AND GUIDELINES

All material furnished by the contractor to be installed on the project shall conform to the minimum requirements of the latest revisions in effect on the date of the Standard Specifications published by the described organizations, unless other requirements are stated in these Specifications.

The latest revisions of the following standard specifications shall govern all of the work, except where amended in the City of Charlotte Landscape Construction Standards or specific project contract.

1. Standard specifications for Roads and Structures, North Carolina Department of Transportation (stated above).
2. City of Charlotte Soil Erosion Control Ordinance
3. Charlotte Land Development Standards Manual
4. American National Standards Institute A300 for Tree Care Operations- Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices
5. American Standards for Nursery Stock. American Association of Nurserymen, Inc. (ANSI Z60.1)
6. Tree and Shrub Transplanting Manual. International Society of Arboriculture
7. Standardized Plant Names. American Joint Committee on Horticultural Nomenclature.
8. Guide for Establishing Values of Trees and Other Plants, International Society of Arboriculture.
9. Chapter 21 of City Code entitled Trees and Administrative Guidelines
10. Crop Fertilization Based on NC Soil Tests; NCDA

Other standard specifications may be combined with those listed above under a single caption whenever referred to in the Specifications as follows:

AAN.....American Association of Nurserymen

AASHTO...American Association of State Highway and Transportation Officials

AIA.....American Institute of Architects

ANSI.....American National Standards Institute, Inc.

ASLA.....American Society of Landscape Architects

ASTM.....American Society of Testing and Materials

AWWA.....American Water Works Association

CLDS.....Charlotte Mecklenburg Land Development Standards Manual (As stated above, latest version)

FSS.....Federal Specifications and Standards, General Services Administration

GS.....General Statutes of North Carolina

ISA.....International Society of Arboriculture

TCIA ... Tree Care Industry Association

UL.....Underwriters' Laboratories

DEFINITION OF TERMS

Whenever the following terms are used in the Standard Specifications, in any of the contract documents, or in the plans, the intended meaning of such terms shall be as follows:

“Owner” or “Engineering Department” shall be replaced by the words “City of Charlotte”

“Engineer” or “Resident Engineer” shall be replaced by the words “City Engineer or his duly authorized representative.”

“City Arborist” shall be replaced by the words “City Arborist or his duly authorized representative.”

The following definitions will apply:

Anti-desiccant: Material applied to plant surfaces for retarding excessive loss of plant moisture and inhibiting wilt. It shall be an approved emulsion, which will provide a film over plant surfaces permeable enough to permit transpiration.

Branch Collar: Wood tissue that forms around the base of a branch between the main stem and the branch. Usually, as a branch begins to die, the branch collar begins to increase in size.

Caliper: Diameter of a tree six inches (6") above the ground for trees less than four inches (4") in diameter and twelve inches (12") above the ground for trees greater than four inches (4") in diameter.

Cambium Layer: Growing point between the bark and sapwood.

Closure: Refers to the roll of the wound wood growth around the wounded area.

Critical Root Zone (CRZ): Area of undisturbed ground, which contains sufficient roots to preserve a tree's health. Determined by calculating the area with a radius in feet equal to one foot in length for each one inch of trunk diameter measured at Breast Height (4.5 feet above grade). When an area of ground cannot be protected in a circle of this radius, the CRZ area may be defined as an asymmetrical shape of the same size.

Cut, The: The exposed wood area that remains after the branch has been removed.

Cut Back: Specified reduction of the overall size of the tree or individual branches, but may include the overall reduction of the sides as well as the top of the tree.

D.B.H.: Diameter of a tree four and a half feet (4 ½') above the average ground line.

Dormant: A condition of non-active growth. Deciduous trees are considered to be dormant from the time the leaves fall until new foliage begins to appear.

Elevating: The removal of lower branches for under-clearance.

Girdling Roots: Located above or below ground level; circular growth around the base of the trunk or over the individual roots applies pressure to the bark area, thereby choking or restricting the flow of sap.

Heading Back: The cutting back of terminals of a temporary limb or branch to a lateral branch or bud to slow its growth, while allowing it to produce food resources for the tree. This is a common nursery practice.

Parent Stem: The main trunk system of the tree.

Planting Medium, Acceptable: A soil developed by amending the existing soil or removing the existing soil and replacing with new soil (as defined in Section 02100 – SOILS). Soil shall be of uniform composition throughout, with admixture of subsoil. Soil shall be free of manmade materials, stones, lumps, live plants and their roots, sticks, and other extraneous matter. Soil shall be capable of sustaining vigorous plant growth and shall meet the definition for topsoil/planting mix found in section 02001.

Precut or Pre-cutting: The removal of the branch at least 6" beyond the finished cut to prevent splitting into parent stem or branch.

Pruning: The removal of dead, dying, diseased, or live, interfering, objectionable and weak branches in a scientific manner.

Sap Flow: The definite course assumed by sap in its movement through a tree.

Scars or Injuries: Natural or man-made lesions of the bark in which wood is exposed.

Suckers: Abnormal growth of small branches usually not following the general growth pattern of the tree.

Temporary Limb: A limb left on a small tree to provide for tree growth until permanent scaffold limbs and adequate top limbs are developed. If large, they are headed back to prevent their challenging the desired terminal for dominance.

Thinning Out: The removal of live branches to reduce wind resistance and to create more space.

Topping: Any pruning practice that results in more than one-third of the foliage and limbs being removed. This includes pruning that leads to the disfigurement of the normal shape of the tree.

Tracing: Careful cutting of the bark along the lines of sap flow to encourage wound closure.

Tree Training: Pruning young trees in a specified manner to shape their growth in keeping with their genetically determined natural form and the urban requirements immediately surrounding them.

Trimming: The same as pruning.

Water Breaker: A hose end device used to diffuse a stream of water.

Wound Wood: New growth made by the cambium layer around all of a wound.

USE OF STREET RIGHT-OF-WAY:

The closure of any portion of the street right-of-way (whole street, travel lane(s) or sidewalk, etc.) Requires a Hold Harmless Agreement executed through the Development Services Division of the Utility Right of Way Management Program Standards and Provisions of the Charlotte Department of Transportation (CDOT). All requests and proposed schedules for Right-Of-Way use must be reviewed and approved by CDOT in advance as follows:

- 10 working days for street closures; and
- 5 working days for travel lanes and sidewalk closures

Contractors must provide necessary warning devices and authorized personnel for safety instructions to pedestrian and vehicular traffic within the Project area. All traffic safety procedures shall be in accordance with the current edition of the United States Department of Transportation, Federal Highway Administration's **Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)**. <http://mutcd.fhwa.dot.gov/>

The Charlotte Department of Transportation Work Area Traffic Control Handbook (WATCH) may be used for reference purposes only.

No Work may be performed on any right-of-way that impedes or restricts traffic flow during the hours of 7:00 to 9:00 AM and 4:00 to 6:00 PM, Monday through Friday. Park on side streets and not on major thoroughfares during the performance of the Work. Parking on roadway medians is prohibited.

Work shall proceed in accordance with Charlotte-Mecklenburg Utilities Water Usage Requirements as regulated.

END OF SECTION

Section 01000

TREE PRESERVATION AND PROTECTION

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STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
40.02	Tree Protection Detail
40.11	Bridging Tree Roots
40.12	Temporary Tree Protection Detail
40.13	Asphalt Curb Placement at Existing Trees
40.14	Rock Chimney

SECTION 01000- TREE PRESERVATION AND PROTECTION

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Purpose:

The purpose of this section is to provide protection for existing trees on public and/or private property during City sponsored construction projects. Where City Code Chapter 21 “Trees” apply, that shall take jurisdiction; in all other cases, these specifications shall dictate the application of tree protection practices and procedures on city sponsored projects.

C. Work Included in this Section:

Construction of Tree Protection Barricades, Replacement of Damaged Trees, Pruning, Curb and Gutter Repair, Replacement and Construction, and Sidewalk Repair and Construction.

D. Related Work Specified Elsewhere:

Landscape Grading, Drainage & Bed Preparation (Section 02000)

Pruning and Removal of Existing Trees (Section 04300)

Fertilization of Existing Trees (Section 04400)

PART 02 – PRODUCTS

A. Non-Woven Textile Fabric:

A needle-punched nonwoven geo-textile composed of polypropylene fibers that form a network that does not allow the fibers to shift. Examples of this type include Mirafi 140 NL, Thrace-LINQ 130 EX, or an approved equal. Fabric must be UV stabilized and resistant to most chemicals found in the soil, mildew and insect damage. Samples must be submitted and approved by the

Engineer. Product Physical Properties:

Weight Minimum 4 oz/yd²

Thickness Minimum 35 mils

Grab Tensile Strength Minimum 90 lbs

UV Resistance 70% (at 500 hrs)

B. Woven Textile Fabric:

Woven geo-textile fabric with a minimum tensile strength of 200 lbs. shall be used under 6 inches of washed stone or suitable alternative whenever construction traffic must pass over the root systems of existing trees in unpaved areas. Landscape Filter Fabric shall be Type 2 Filter Fabric as specified in Section 1056 of NCDOT Standard Specifications for Roads and Structures.

Samples of Filter Fabric shall be submitted to the Engineer for approval prior to installation.

Product Specification:

Type:	100% Polyester
Minimum Tensile Strength:	200 lb
Elongation:	15% Min.
Minimum Burst Strength:	400 psi
Minimum Puncture Strength:	80 lb
AOS (min/max):	30/130
Minimum Ultra Violet Exposure Strength:	140 lb
Fungus Resistance:	No Growth

Tree Protection Barricade Fencing:

Barricades shall be constructed of wood, in accordance with Part 03 B of these specifications. Orange safety fencing, three feet high, or a suitable alternative, may be used in lieu of wood rails if approved by the Engineer. The installation of orange construction fencing in the right-of-way shall not inhibit driver and/or pedestrian vision at driveways and/or street intersections.

PART 03 – EXECUTION

Trees designated for Tree Protection on city-funded or city-sponsored construction projects shall have their critical root zone protected by tree barricades installed according to 40.02 Tree Protection detail and where applicable, by the use of details 40.11 Bridging Tree Roots, 40.12 Temporary Tree Protection and 40.13 Curb Placement at Existing Tree.

When trees are located within the street right-of-way or on City property, they shall be protected from damage and/or removal per the City of Charlotte Tree Ordinance. Any proposed construction adjacent to Public Right-of-Way involving trees or root system shall require a permit from the City Arborist. Signature of a representative of Landscape Management on final

construction plans and documents constitutes the express approval of the City Arborist. This includes the following: storm drainage, underground utilities, driveways, sidewalks, etc.

A. Boring and Trenching:

Open trenching, including pilot and/or receiving holes, closer to a tree than:

Trees Diameter (D.B.H.)	Radial Distance (feet)
Less than 6	Limb spread
6" - 9"	5'
10" - 14"	10'
15" - 19"	12'
20" - 30"	15'
Over 30"	20'

will be considered harmful to the trees unless a boring construction method is performed. Any exceptions must be approved by the Engineer in coordination with the City Arborist. Utilities may be tunneled in the root zone at a 24" minimum depth providing that plans are approved showing the location and method.

C. Curb and Gutter Repair and Construction:

When working to install curb and/or guttering within 10 feet of any tree (12 inches or larger in diameter), plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed back of curb unless the City Arborist has provided approval. Root pruning will be in accordance with Tree Preservation and Protection Standards, Part 03-L, entitled "Root Pruning". If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place.

C. Sidewalk Repair and Construction:

When working within 10 feet of any tree 12 inches or larger in diameter, plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed edge of the sidewalk unless the City Arborist has provided approval. Root pruning will be in accordance with Tree Preservation and Protection Standards, Part 03-L entitled "Root Pruning." If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place. Narrow sections of sidewalk will be constructed in accordance

with directions from the Engineer and no less than 48 inches in width. Bridging of large roots will be in accordance with Standard Detail (CMLDS 40.11).

D. Barricade Fencing:

Barrier fences shall extend around trunk as shown on Landscape Standards CMLDS 40.02 to encompass the Critical Root Zone. So defined, it shall encompass the trees with a radius of not less than one foot (1') for every one inch (1") of trunk diameter (critical root zone) unless otherwise detailed in plans. When a circular or nearly circular area of this radius cannot be protected due to project design constraints, then an asymmetrical Critical Root Zone area shall be enclosed by the barricade fencing and shall be constructed around the tree which encompasses an equal area (square footage) of critical root zone. Barricade fencing shall not be placed closer than four feet (4') from the tree trunk flare. Deviations from this must be approved on an individual basis by the Engineering Department and the City Arborist.

All tree protection barriers shall be installed prior to any grading or other land disturbing activity. They shall be constructed from any material substantial enough to designate the protected area and to protect the roots, trunk, and crown of the tree. Example: 2 x 4 standards and 1 x 4 rails; 3' high orange safety fencing, etc.

E. Trunk Protection:

See CMLDS 40.12. Batter boards and sand bags will be installed when working within 10 feet of any tree 12 inches or larger. The purpose of these items will be to protect the trunk or root flare from damage during construction.

F. Temporary Access:

Permits shall be issued to allow temporary (30 days) access across the critical root zone (CRZ)

Mulch 8 to 12 inches deep with woven geo-textile as specified in "Tree Preservation and Protection," Part 02 – Products, or approved equivalent laid underneath, shall be required in these areas to act as a cushion to prevent soil compaction. Mulch and fabric shall be removed after construction is complete. If soil conditions, equipment type, or volume of traffic across the CRZ is such that mulch is deemed to provide insufficient protection from soil compaction or root damage, then additional load-displacement groundcover mats shall be employed.

G. Root Zone Protection

Do not store materials or machinery in any portion of the critical root zone.

H. Fill Around Existing Trees to Remain:

No Fill dirt greater than two inches (2") in thickness shall be allowed over the critical root zone of the tree. Deviations from this must be approved on an individual basis by the Engineering Department and the City Arborist.

I. Clearing within Critical Root Zone:

In the critical root zone, the removal of any portions of old sidewalk, driveway, and/or curb shall be done with extreme care so as not to damage any portion of the branches, trunk, or roots.

In the critical root zone, any stumps, dead trees and shrub growth to be removed shall be cut flush or ground out. Stump grinding will be accomplished with equipment and methods per Section 04300 PRUNING AND REMOVAL OF ESTABLISHED TREES, PART 3 H, Stump Grinding. All holes will be backfilled completely the same day of the operation. Stumps to be ground out will be designated by the Engineer. No grubbing is permitted in the critical root zone areas.

J. Tree Damage:

Any tree damage caused by the Contractor is to be repaired immediately at no additional expense and to the satisfaction of the City. Any damages resulting in the disfigurement and/or shortened life expectancy of a tree will be evaluated by the City Arborist. The entire value of the tree will be pro-rated by the loss of life expectancy and that value assessed to the Contractor. Trees damaged beyond repair, as judged by the City Arborist, are to be removed at no expense to the City, and replaced by trees of size and species designated at no additional expense to the City; or the dollar value of such damaged trees as determined by the City Arborist is deducted from the monies owed the Contractor. The tree values will be determined by using the guidelines in the Tree Evaluation Guide by The International Society of Arboriculture. Climbing irons, spurs or spikes shall not be used on trees to be pruned and are only allowed on trees to be removed.

A MINIMUM FINE OF \$50 WILL BE ASSESSED FOR EACH INCIDENT OF BARK AND CAMBIUM DAMAGE OF 4" WIDTH OR LESS WHERE RESTRICTIONS ARE VIOLATED. IF DAMAGE IS LARGER, DAMAGES WILL BE ASSESSED USING I.S.A. TREE EVALUATION GUIDE PROCEDURES.

K. Discontinuance of Work:

Any practice obviously hazardous to people or harmful to the trees, as determined by the City, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice to discontinue such practice.

L. Root Pruning:

Root pruning shall be kept to an absolute minimum. In no case shall any root be pruned that is 1 ½ inches in diameter or greater without the express permission of the Engineer or City Arborist.

All roots proposed to be cut shall be located in advance at a point 6-12" outside the proposed cut by using a shovel, a probe, a high-pressure stream of water, air excavation tool or other approved method. The cut is to be made no more than 6" behind the back of the curb, wall, or other structure to be built. The cut shall be made only to the minimum depth required for the structure. The roots shall be cut cleanly leaving a smooth surface. Root pruning equipment shall be kept sharp to ensure that roots are cut cleanly and are not broken or torn by dull or unsuitable equipment.

M. Pruning and Thinning of Existing Trees:

All pruning shall be in accordance with The Pruning and Removal of Existing Trees Standards and ANSI A300 for Tree Care Operations- Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices.

N. Tree Preservation:

The City Arborist must approve all tree removals from city-owned property. Signature of a representative of Landscape Management on final construction plans and documents constitutes the express approval of the City Arborist.

O. Clean Up:

Remove all barriers upon completion of project and fill the holes left by vertical posts of fencing with suitable soil. Restore area to original condition.

END OF SECTION

Section 02000

LANDSCAPE GRADING, DRAINAGE & BED PREPARATION

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STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
40.01	Tree Planting Detail
40.03	Large and Small Tree Pit with Grate in Sidewalk (Plan)
40.03A	Large and Small Tree Pit with Grate in Sidewalk (Section)
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40.05A	Shrub Planting Bed
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40.06	6' Tree Planting Strip UMUD Only
40.08A	Median Greater Than 120" Wide – Excavation, Drainage & Backfill
40.08B	73" to 120" Wide Median - Excavation, Drainage & Backfill
40.08C	48" to 72" Wide Median - Excavation, Drainage & Backfill

SECTION 02000 – LANDSCAPE GRADING, DRAINAGE & BED PREPARATION

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

Stripping, stockpiling, and redistribution of topsoil, rough grading, rock removal, excavation of the soil and landscape bed construction.

Related Work Specified Elsewhere:

NCDOT Division 2 - Earthwork

Soils (Section 2100)

Shrub and Groundcover Planting (Section 04000)

Tree Planting (Section 04100)

Seeding and Sodding Turfgrass (Section 04200)

C. Existing Conditions:

Contractor shall accept actual conditions at the project site and do work specified without additional compensation for possible variation from grades and conditions shown, whether surface or subsurface. All grading work shall be unclassified except for rock removal as described herein.

D. Protection:

Benchmarks and Monuments:

Maintain carefully all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed. If found at variance with the drawings, notify the Engineer before proceeding to lay out the work.

Protection of Existing Work Remaining:

All existing curbs, sidewalks, driveways and paving damaged in performance of this work shall be restored, without additional cost to the Owner in the manner prescribed by authorities having jurisdiction.

Tree Preservation and Protection:

During all phases of earthwork and site grading, the Contractor shall comply with Section 01000.

PART 02 – PRODUCTS

A. MATERIALS:

Topsoil and Planting Mix:

Topsoil and Planting Mix shall be defined in Section 02100 SOIL.

Non-Woven Textile Fabric:

A needle-punched nonwoven geo-textile composed of polypropylene fibers that form a network does not allow the fibers to shift. Examples of this type include Mirafi 140 NL, Thrace-LINQ 130 EX, or an approved equal. Fabric must be UV stabilized and resistant to most chemicals found in the soil, mildew and insect damage. Samples must be submitted and approved by the Engineer.

Product Physical Properties:

Weight Minimum 4 oz/yd²

Thickness Minimum 35 mils

Grab Tensile Strength Minimum 90 lbs

UV Resistance 70% (at 500 hrs)

Woven Textile Fabric:

Woven geo-textile fabric with a minimum tensile strength of 200 lbs. shall be used under 6 inches of washed stone or suitable alternative whenever construction traffic must pass over the root systems of existing trees in unpaved areas. Landscape Filter Fabric shall be Type 2 Filter Fabric as specified in Section 1056 of NCDOT Standard Specifications for Roads and Structures.

Samples of Filter Fabric shall be submitted to the Engineer for approval prior to installation.

Product Specification

Type: 100% Polyester

Minimum Tensile Strength: 200 lb

Elongation: 15% Min.

Minimum Burst Strength:	400 psi
Minimum Puncture Strength:	80 lb
AOS (min/max):	30/130
Minimum Ultra Violet Exposure Strength:	140 lb
Fungus Resistance:	No Growth

B. Surplus Material:

Contractor shall remove unsuitable materials and surplus excavated materials from the site and legally dispose of it.

PART 03 – EXECUTION

A. Inspection:

Examine the areas and conditions under which earthwork and site grading is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Testing:

Laboratory:

The owner shall utilize services of a testing laboratory to perform tests required under this section.

Quality Control Testing During Construction:

It is the responsibility of the Contractor to notify the Engineer at appropriate times when Testing is required. Field density tests shall be performed in accordance with ASTM D-698.

C. Soil Preparation:

A sample of the proposed topsoil or planting mix to be used in beds shall be submitted to the Engineer 30 calendar days prior to installation and be approved prior to installation.

Soil preparation for planting areas is divided into four categories depending on the situation.

Soil and Planting Media shall not be handled or spread when moisture content is excessively high

Type 1

The “Type 1” planting bed preparation is intended for areas in which the existing soil is of sufficient quality that it can be retained and amended to achieve the specifications for an Acceptable Planting Media

Where vegetation currently exists, it shall be removed by scraping away the top 3”- 4” of existing grade. This material shall be hauled away and disposed of in accordance with the contract provisions.

The Contractor shall install a sufficient quantity of soil to achieve the desired/specified final grade and soil specification. Soil shall be added in an amount sufficient to account for natural settling of the final soil product and provide slight positive drainage from the middle of the bed to the sides of the bed.

All planting beds and areas to be mulched shall have a 4” V-cut trench installed at the perimeter of the planting bed and adjacent to concrete walks, curbing, and grassed areas. The V-cut trench shall form the bed line edge. Trench depth and width shall be consistent and uniform throughout the installation.

All planting beds shall be tilled to a depth of at least 8” below the final finished grade. All soil amendments shall be mixed thoroughly and completely with the existing soil.

Type 2

The “Type 2” planting bed preparation is intended for areas in which the existing soil is to be removed to a depth of 18” and replaced with soil meeting the plant mix specification. This preparation also includes the tilling or loosening of the remaining material in order to provide aeration and lessen compaction.

The top 18 inches of existing soil shall be removed and disposed of in accordance with the contract provisions. The remaining material shall be tilled in place to a 6” depth

The Contractor shall install a sufficient quantity of approved plant mix to achieve the desired/specified grade. Add soil in an amount sufficient to account for natural settling. Unless otherwise specified, the plant bed shall be graded as follows:

- Roadway medians & Planting beds – crown height in inches shall be equal to median width in feet with a maximum height of 6 inches.
- Roadway plant strips-achieve positive drainage from front of walk to back of curb
- Plant beds in turf areas or around buildings – 6” above surrounding grade at center of bed, 2” above grade at edge of bed.

All planting beds and areas to be mulched shall have a 4" V-cut trench installed at the perimeter of the planting bed and adjacent to concrete walks, curbing, and grassed areas. The V-cut trench shall form the bed line edge. Trench depth and width shall be consistent and uniform throughout the installation.

All work shall be achieved from the sides of the planting bed areas. The contractor shall not allow equipment to operate on the loosened soil or plant mix.

Type 3

The "Type 3" planting is intended for individual tree and individual/group shrub planting where no soil replacement is required unless specified by the engineer or a representative of Landscape Management.

The tree and shrub planting procedures, including preparation of backfill and planting hole are found under: TREE PLANTING – Section 4100 and SHRUB AND GROUND COVER PLANTING Section 04000. For trees installation follow Standard Detail 40.01 "Tree Planting".

Type 4

The "Type 4" planting is intended for individual tree planting in medians and roadside planting strips and shoulders.

The preparation for installation of the trees shall include the tilling of a 10'x10' area centered on the new tree location. The existing soil shall be broken up to a depth of 18" within that 10'x10' area and one cubic yard of composted soil conditioner shall be thoroughly mixed throughout. Soil in the bottom of the tree pit shall be firmly tamped to reduce settling.

END OF SECTION

Section 02100

SOIL

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		Soil Types – Planting Mixes
Page 6	EXECUTION	Soil Specifications

STANDARD DETAILS

Standard Number

Title

INTENTIONALLY BLANK

SECTION 02100- SOIL

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

Provide or create soil mixes for planting that meets or exceeds the standards contained herein.

Related Work Specified Elsewhere:

Landscape Grading & Drainage (Section 02000)

Shrub and Groundcover Planting (Section 04000)

Tree Planting (Section 04100)

Seeding and Sodding Turfgrass (Section 04200)

PART 02 – PRODUCTS

A. Soil Types:

Topsoil :

Topsoil is the surface layer of the soil profile, generally characterized as darker than the subsoil due to enrichment with organic matter. It is the major zone of root development and biological activity. Microorganisms that enhance plant growth thrive in this layer. Topsoil can usually be differentiated from subsoil by texture as well as color. Clay content usually increases in the subsoil. The topsoil layer may be quite variable.

Native soil on site or natural soil harvested from another site may have the texture and composition to meet the specification described above, .

Planting mix:

A planting mix may be developed that will be an Acceptable Planting Media by amending the existing soil or by removing the existing soil and replacing it with new planting mix. The planting mix shall have uniform composition throughout, with a mixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter. It shall contain no man-made materials unless otherwise specified. Planting mix shall not be used while in a frozen or muddy condition.

Unless otherwise specified in the contract documents, the Acceptable Planting Media shall contain the following specified percentages of constituents:

CLAY	Minimum 10%/ Maximum 40%
SAND	Minimum 20%/ Maximum 50%
SILT	Minimum 20%/ Maximum 50%
ORGANIC MATTER	Minimum 5%/ Maximum 10%

Organic Matter is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Percentage of organic matter shall be determined by loss on ignition of moisture free samples dried at 65 degrees.

APM shall have a have an acidity range of pH 5.5 to 7.0.

APM shall have a Cation Exchange Capacity (CEC) from 5 to 25 cmol +/-kg(meq/100g)

APM shall have normal contents of nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and proper micronutrient levels. Nutrient levels must satisfy growing needs (as recommended by lab report) of the existing or planned plant material.

B. Soil Conditioner:

Work covered in this special provision includes supplying and applying composted soil conditioner. Soil conditioner is an organic soil additive that is mixed with the soil in order to improve its internal drainage, structure, nutrient holding capacity, nutrient holding capacity or to improve organic matter composition. Composted soil conditioner must be thoroughly mixed and tilled into the existing soil in all areas to be planted.

Soil conditioner shall be composted and aged pine bark or approved material, screened to be 9/16" size or smaller. It shall be black in color, not be fresh, have no pine bark smell and have a acidity of pH 5.8 to 6.0. A sample of the composted soil conditioner must be submitted to the City for approval prior to installation.

PART 03 – EXECUTION

A. Approval of Soil/Planting Media:

Soil/Planting Media supplied must meet the specifications detailed in Section 2100 Part 2 - Products.

B. Lab Testing

Soils/Planting media testing shall be performed by a lab/facility that is a participant in the North American Proficiency Testing Program (NAPT) a program of the Soil Science Society of America.

C. Pre-Approved Soils List

Planting mix may be placed on a pre-approved list by The City of Charlotte's Landscape Management Division. A supplier must demonstrate that they have the ability to provide the planting mix as described above and be consistent with the product. The City of Charlotte Landscape Management updates this list annually. New vendor's products can be tested (and if approved) added throughout the year and placed on the list at the contractor's or vendor's request. Thirty calendar days for approval is required.

END OF SECTION

Section 03000

LANDSCAPE IRRIGATION SYSTEMS

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STANDARD DETAILS

Standard Number	Title
40.04	Typical Valve and Valve Box Installation

Landscape Irrigation Systems

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

The work of this section shall consist of providing and installing the underground sprinkler system as specified on the drawings and as specified herein.

C. Quality Assurance:

Manufacturing Qualifications:

Provide underground sprinkler system as a complete unit produced by a single manufacturer for all portions of work, including heads, drip lines, valves, piping circuits, controls, and accessories; unless otherwise noted specifically on the drawings.

D. Submittals:

Product Data:

Submit manufacturer's technical data, cut sheets, and installation and maintenance instructions for underground sprinkler systems.

E. Existing Conditions:

Verification of Underground Utilities:

The Contractor shall be responsible for verifying the exact location of all underground utilities prior to any excavation.

F. Preservation of Existing Trees:

The Contractor shall comply with the Tree Preservation and Protection Standards.

PART 02 – PRODUCTS

A. PVC Pipe and Fittings:

Pipe specified shall be virgin high-impact Polyvinyl Chloride (PVC) pipe having a minimum working pressure rating of Class 200 up to and including 1¼" and Class 160 for pipe above 1¼". All PVC pipe shall be continuously and permanently marked with manufacturer's name, material size, and schedule. Pipe shall conform to US Department of Commerce Commercial Standard CS207-60 or latest revision. Material shall conform to all requirements of Commercial Standard (CS256-63), or latest revision(s). Fittings to be used on specified PVC pipe shall be Schedule 40 PVC, Type 1, and must be of domestic manufacture. All fittings shall be identified as to pressure rating or schedule.

Solvent for use on PVC pipe and fitting shall be of a type approved by the manufacturer of the pipe. Primer shall be purple primer by the same manufacturer as solvent. Solvent and primer application shall be in accordance to the manufacturer's recommendations. Excessive solvent and primer within and outside of the pipe is unacceptable.

B. Risers and Swing Joint Nipples:

All pipe risers ¾" to 1" shall be non-plasticized polyvinyl chloride. Schedule 80 threaded pipe. Fittings on risers shall be PVC Schedule 80 threaded elbows. If the plan shows a non-PVC riser, compatible fittings to the riser specified shall be used.

C. Irrigation Valves:

Irrigation valves shall be molded valves with 24 volt solenoid as per the Equipment List noted on the drawings. Valves shall be globe type operated by low-voltage solenoids normally closed, manual flow adjustment.

D. Backflow Preventers:

Backflow preventers shall be the responsibility of the Irrigation Contractor. Irrigation point of connection is downstream side of the meter. Backflow preventer shall be installed by a licensed plumber of Irrigation Contractor and shall comply with state and local codes. Backflow preventer selection and installation is to meet or exceed local and state codes, and manufacturer's recommendations.

E. Meters:

Irrigation Contractor shall coordinate with Charlotte Mecklenburg Utilities for the installation of the irrigation meter(s) and shall be responsible for all costs and fees associated. All meters & valves installed in public Right-of-Way shall be installed per Charlotte Mecklenburg Utilities requirements.

F. Sprinkler Heads:

All full and part circle sprinklers shall be of the fixed spray or gear driven variety as is specified on the plans. These sprinklers shall be of the pop-up type with spring retraction. The sprinkler shall be easily serviced from the top. It shall have an accessible screening device and shall perform to the manufacturer's specification with regard to the diameter of throw and applied volume at a given pressure. Spacing of heads shall not exceed the manufacturer's maximum recommendation. No over spray shall be allowed to encroach on roadways, sidewalks, buildings, nor the like.

G. Valves, Sleeves & Boxes:

All irrigation pipes crossing under any streets shall be enclosed in a PVC sleeve as noted on the plan. Sleeves shall be Schedule 80 PVC, Type 1, and must be of domestic manufacture. Pipe sleeve shall not be less than two times (2X) the outer diameter of the sleeved irrigation pipe(s).

Fiberglass or concrete boxes with fiberglass or equal covers capable of withstanding lawn tractor traffic and vehicle traffic shall be used as specified in the Equipment List on the drawings (Ameteck or approved equal).

All systems shall be approved by Landscape Management and installed to prevent unnecessary watering after substantial rainfall.

H. Drainage Backfill:

NCDOT number 78M washed stone.

I. Automatic Control System:

Furnish automatic controller as specified in the Equipment List, including 24 volt timer and all connection devices. Electrical hook-up to the controller shall be by others unless specifically noted otherwise on the plan or Equipment List. All automatic control systems shall utilize a rain sensor device and installed in accordance to the manufacturer specifications.

J. Exterior Control Enclosure:

Manufacturer's standard weatherproof enclosure with locking cover, complying with the NFPA 70 (National Electric Code) and according to the Equipment List shown on the Drawings, shall be used.

K. Control Lines:

Hydraulic: All control tubing shall be polyethylene tubing. All control tubing shall be rated for a minimum continuous working pressure of 200 psi and have a ¼" O.D. + .003". All tubing connection shall be brass compression couplings or tees utilizing self-aligning brass ferules, secured by ¼" plastic retainers.

L. Electrical Installation:

Electric control lines from each controller to the automatic valves shall be direct burial UF wire of a different color than the black and white wires used on the 115 volt A.C. power.

All 24V A.C. single strand wire shall be a minimum of 14-gauge, direct burial. Where multi-connector wire is used, it shall be a minimum of 18-gauge. Manufacturer recommendations shall be followed concerning waterproofing all connections.

The joining of all underground wires shall be by the use of direct burial splice kits. All splices shall be waterproof. In all cases, wire shall be adequately sized to avoid excessive voltage drop.

M. Drip Irrigation:

All drip irrigation system's drip line shall be pinned to the soil every two feet (2') or as necessary to prevent the drip line from rising from the surface. When a water pressure reducer is required, it shall be accessible within a valve box and easily replaced. Filtration systems on the drip irrigation system shall consist of a 120 mesh self-flushing mechanism or as specified by the manufacture and placed within a valve box.

PART 03 – EXECUTION

A. Inspection of Work in Progress:

The Engineer shall make frequent observations of the Contractor's work while such work is in progress and will notify the contractor of unacceptable work or materials.

B. Marking of Sprinkler Locations:

Marking of sprinkler locations shall be done by the Contractor and approved by the Engineer. Location shall be according to plans provided with field modifications to adjust to local conditions and actual plant locations.

C. Excavation:

The Contractor shall notify NC ON CALL at 1-800-632-4949 a minimum of 48 hours prior to beginning trenching. The Contractor shall exercise care to avoid causing damage to any and all underground utilities and structures. The Engineer shall advise the Contractor of any underground utilities or structures he is aware of; however, it is the Contractor's responsibility to locate and to protect all utilities. Any damage to utilities shall be corrected and paid for by the Contractor.

All excavation shall be unclassified and shall include all materials encountered.

The minimum depth of cover for piping 6" diameter and larger shall be 18". The minimum depth of cover for piping less than 6" diameter shall be 12".

On existing sod areas, sod shall be removed, preserved, and replaced to its original state once backfilling is accomplished.

Root damage within the critical root zone in violation of specifications will result in monetary damages being assessed based on loss of utility and shortened life of the tree.

If trenching through existing asphalt roadway is necessary, a permit must be obtained through the CDOT Right of Way Management Program. If trenching is necessitated through existing asphalt roadways, the Contractor shall saw cut asphalt to the width of the trench plus one foot (1') each side prior to trenching unless noted otherwise on the plan. Removal of cut asphalt and replacement of all asphalt shall be the responsibility of the Contractor. Repair will be made with full depth asphalt or as directed by the engineer.

D. Boring:

See- Tree Preservation and Protection, Part 03 A.

E. Backfilling:

Backfill material shall be select backfill free from rocks, large stones, and other unsuitable substances that could damage the pipe or create unusual settling problems. Backfilling will be installed in 6" layers and tamped after each layer is put in to prevent excessive settling.

Backfilling of trenches containing plastic pipe shall be installed when pipe is cool to avoid excessive contraction in cold weather. Such backfilling can be done in early morning hours or the pipe may be water cooled prior to backfilling procedures.

F. Installation of System Main:

Installation of the system main shall be in accordance with the manufacturer's instructions and shall proceed from the point of connection of supply for the system pumping station, reservoir, water meter, or existing line. All pipes shall be thrust blocked at all tees, elbows and end caps per manufacturer specifications. The main and laterals shall be flushed and pressure tested for 24 hours prior to making any head connection.

G. Installation of Lateral Lines:

Lateral lines may be installed by standard trenching techniques or by "pulling in" pipe. If the "pull in" method is used, the pipe "plow" shall be a vibratory type and equipped with a turf roller device to prevent tearing of the turf. The Mole or Bullet which precedes the pipe and is used to form the opening for the pipe shall be not less than 1" larger in diameter than the outside diameter of the pipe. Starting and finishing holes shall not exceed a 2 foot square opening, with the sod removed from such holes to be preserved and replaced.

Lateral pipes and fittings shall be installed in accordance with the manufacturer's recommendations, including the snaking-in of the PVC pipe to prevent excessive strain when contracting in cold weather. All lateral lines shall be thoroughly flushed prior to the installation of any automatic valves or sprinkler heads.

H. Sprinkler Heads:

All sprinklers shall be installed on pop-up risers or as shown on the drawings. The sprinkler head shall be installed so that the top is ¼" above the finished grade level. If finished grade has not been established, the sprinkler will be extended a minimum of four inches (4") above existing level and marked with a stake to prevent damage by equipment. Backfill around sprinkler heads shall be free of large rocks, roots or foreign debris.

Matched precipitation will be required on all full and part circle sprinklers operating on the same zone

I. Control Lines:

All control lines shall be installed in a neat and orderly fashion and may be installed either in the main and lateral trenching or in their own separate trench. The lines shall be bundled together and taped every 10 feet. Control lines connections shall be as approved in a proceeding section of these specifications.

All wire shall be furnished in minimum 2,500 foot reels and spliced only at valve or tee locations. Wire sizing shall be as specified on the plan.

The joining of all control wire will be by the use of wire nuts installed in Scotch DBY or DBR or approved equal direct bury splice per installation instructions provided by the manufacturer. A minimum of 18 inches of additional wire shall be looped up at each control valve or head. Control tubing and wire runs shall be installed with enough slack and/or occasional loops to prevent excessive strain due to thermal contraction.

J. Control Equipment:

All automatic valves and controllers shall be installed following the recommendations of the manufacturer of said equipment, and more specifically, in accordance with the drawings accompanying the contract. The location of all controllers shall be approved by the Engineer's representative before the actual installation of said controllers.

K. Valve Boxes, Drains, Etc:

All valve boxes or any other miscellaneous marker or access box shall be installed so the top of said structure is flush with finished grade. Valve boxes shall be installed so that no portion of the box rests directly on any section of the systems piping. Valve boxes shall be installed so

that the top of control valves are easily accessible for maintenance. All extensions of valve boxes necessary to reach proper grade shall be made with extensions approved for that particular brand. Any valve box located within the sidewalk shall be concrete.

L. Testing and Acceptance of System:

1. Testing System:

Upon completion of the irrigation system and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be tested for proper operation. All air will be flushed from the system and all components will be checked for proper operation by the Contractor.

Balancing and Adjustment: The Contractor shall balance and adjust the various components of the sprinkler system so that overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to pressure regulators, pressure relief valves, part circle sprinkler heads, and individual station adjustments on the controllers.

2. Operational Testing:

Perform operational testing after hydrostatic testing, backfill is in place, and sprinkler heads are adjusted to final position. Demonstrate to Engineer's representative that the complete system meets coverage requirements and that automatic controls function properly.

3. Final Grades at Heads:

After completion of siding, planting and mulching and settlement with establishment of the final grades, carefully adjust all irrigation equipment so it will be flush with or not more than ¼" above grade.

4. Notice to Completion:

When the Contractor is satisfied the system is operating properly, and all work and clean-up is completed, he shall issue the notice of completion to the Engineer. The notice of completion shall include the request for final inspection.

5. Final Inspections with Engineer:

The Engineer will respond to the notice of completion by the Contractor and shall appear at an agreed upon time for the final inspection. Any inconsistencies to the plans or specifications shall be noted by the Engineer and a written copy of corrections shall be given to the Contractor.

6. Record Plan Acceptance:

Acceptance of the system is based on the furnishing by the Contractor, of a completed record plan, which is acceptable to the Owner and/or Engineer.

7. Training of Maintenance Personnel in Operation and Maintenance Systems:

The Contractor's responsibility of training maintenance personnel in the operation and maintenance of the system shall not be waived due to acceptance of the system. In addition, the Contractor shall provide the Owner with an available parts list, trouble-shooting list, and specification sheet. If this responsibility is not fulfilled, the cost of obtaining the training by the Engineer shall be shown as a deduction in the final payment.

M. Guarantees:

The work included under this contract shall be guaranteed by the Contractor against all defects and malfunctions due to faulty workmanship or defective material for a period of one year from the date of final acceptance by the Engineer. Upon being informed by the Engineer of any defects or malfunctions; the Contractor shall affect all necessary repairs and/or replacements in a reasonable expedient manner at no additional cost to the Engineer.

END OF SECTION

Section 04000 (shrubs)

SHRUB AND GROUNDCOVER PLANTING

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STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
40.05A	Shrub Planting Bed
40.05B	Individual Small Shrub / Tree Planting
40.08A	Median Greater than 120 inches Excavation, Drainage, and Backfill
40.08B	73 to 120 Inch Median Excavation, Drainage, and Backfill
40.08C	48 to 72 Inch Median Excavation, Drainage, and Backfill

SHRUB AND GROUNDCOVER PLANTING

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

The work required under this Section consists of all preparation, planting and related items necessary to complete the work indicated as described in the Specifications, in addition to the supplying of all plants specified on plant list except those plants covered in Sections 04100 and 04200.

All planting shall be executed during the planting season (October 15 thru April 15), unless exceptions are made in writing by the Engineer.

All plant species, sizes, forms, shapes and locations will be subject to approval by the Engineer.

C. Payment:

Payment will be made under:

Plant Name.....Ea.

Unit bid price shall include installation and all other specifications and guidelines required per most recent revision of Landscape Management Division's Landscape Construction Standards. Installation includes planting, soil amendments, mulch, staking, watering and warranty.

D. Substitutions:

The species or varieties, materials, products or sizes specified by botanical and common name, shall be provided as specified. Only upon written application by the Contractor to the Engineer, and when such application is approved in writing by the City of Charlotte, will substitutions be permitted. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution. The contractor must submit a list of a minimum of 10 sources of plant suppliers that have been contacted. The list must include the name of the plant supplier, contact name, date and time.

If proof is submitted, substantiated in writing, that any plant specified is not obtainable by the Contractor, the City will attempt to locate the specified plant. If the City is able to locate the

specified plant (s), the request for a plant substitution will be denied.

If the specified plant (s) proves to be unavailable, the City of Charlotte will consider the use of a substitute plant.

PART 02 – PRODUCTS

A. Soil:

Soil shall be defined in SOIL Section 02100

B. Plant Material:

Supply all plants as specified in plant list as shown on drawings. Plants shall be typical of their species and variety, have normal growth habits, have well-developed branches, be vigorous, and have fibrous root systems. No plants will be accepted unless they show healthy growth and satisfactory foliage conditions. Size of plants, spread of roots and size of rootballs shall be in accordance with American Standard for Nursery Stock (ANSI Z60.1, latest revision), as published by the American Association of Nurseryman, Inc. All plants of each particular variety shall be uniform in size and configuration, and shall be labeled with correct plant name and size.

Balled-and-burlap plants shall be nursery grown and freshly dug. Burlap shall be untreated and biodegradable. No plants showing evidence of “made” root balls will be accepted.

Containerized plants shall have a root system sufficient enough in development to hold the soil intact when removed from the container. The root system shall not be root bound (a condition where the root system is dense in mass), excessively intertwined or have an established circular growth pattern.

Nursery labels shall be attached securely to plants, bundles and containers of plant materials of each specified type delivered at the following minimum rates:

Flats	1 label per Flat
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Containers	25% of each specified containerized plant
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Bulk Plant Material shall have 1 label per box. All patented plants shall have a patent number on tag.

Plant nursery labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process lettering. These nursery labels shall be removed by the Contractor after the final acceptance, at the request of the City of Charlotte. Plants shall conform to measurements specified in the plant lists, except that plants larger than specified may be used if approved by the Engineer. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant in accordance with the American Standards of Nursery Stock.

Shipment and Delivery:

The Contractor shall furnish an itemized list from the plant nursery or grower of the actual species, variety, quantity and sizes.

The Contractor shall deliver the necessary inspection certificates to accompany each plant or shipment prior to acceptance and planting.

When shipment is made by open truck, pack all plant material to provide adequate protection against climate and breakage during transit, and tie to prevent wind-whipping. The tops shall be covered with tarpaulin to minimize wind-whipping and drying.

Exercise care at all times during handling operations to prevent damage to bark, branches, and root system. Employ a suitable method of handling to insure the careful delivery of heavy balled plants to preclude loose or crushed plant balls. All balled and burlap plants shall have wire baskets.

Plants shall be free from defects and injuries, and shall be certified by the State and Federal Departments of Agriculture to be free from plant diseases and insect infestations.

C. Fertilizers:

The fertilizer shall have 30% and 40% of its nitrogen in a slow-release water-soluble form. The chlorine content shall not exceed two percent. The fertilizer ratio of macronutrients shall be approximately 3-1-1, 3-1-2, or 1-1-1 and contain all micronutrients needed for normal plant growth. The actual amount of the chosen product will be adjusted to deliver one-quarter pound of actual nitrogen per 100 square feet of area.

Examples of fertilizers ratios that meet these criteria:

Ornamental plant fertilizer	12-6-6	2 lbs/100 sq ft
Ornamental plant fertilizer	14-7-7	2 lbs/100 sq ft

D. Herbicide:

Pre-emergent herbicides to be applied at planting prior to mulch application shall contain the chemical trifluralin, oryzalin or substitute approved by the Engineer.

E. Mulch:

Mulch shall consist of double-hammered hardwood mulch or shredded pine bark mulch as specified on the plans and specifications. All mulches shall be free of any foreign materials, wood pieces larger than 2 inches and/or green wood.

F. Water:

Water shall be free from oil, acids, alkalis, salts or any other substances that are toxic or otherwise harmful to vegetation. Water from an untreated source (e.g. pond or well) must be approved by the Engineer.

PART 03 – EXECUTION

A. Plant Approval Process:

Plant approval is Monday through Friday from 8:00am until 10:30am at the City of Charlotte Landscape Management offices, only. No plant approval shall take place on City of Charlotte holidays.

A representative sample of each plant type shall be submitted to Landscape Management for approval. If a specified plant is obtained from multiple nursery sources, there must be a representative sample submitted from each source used.

Landscape Management will mark each approved representative sample with a numbered acceptance tag. Contractor shall not remove the numbered acceptance tag until requested by the City of Charlotte. Landscape Management will provide written documentation of approval to Contractor's representative for submittal to project inspector.

B. Planting Preparation:

Before excavations are made, cover the surrounding turf, if existing, in a manner that will satisfactorily protect all turf areas that are to be driven over, and upon which soil is to be temporarily stacked pending its removal or reuse. Barricade existing trees, shrubbery and beds that are to be preserved in a manner that will effectively protect them during planting operations or as specified on the plans.

Subsurface Improvements: Observe proper precautions so as not to disturb or damage subsurface improvements.

Contractor is responsible for locating any and all utilities prior to excavation.

Prior to excavations, Contractor shall notify North Carolina One-Call Center, Inc. to ascertain locations of electrical cables, conduits, utility lines, oil tanks, supply lines, subsurface drainage, and irrigation lines, etc. Contractor shall notify Charlotte Department of Transportation to locate any lines/structure associated with traffic control devices. Notify the Engineer should the above-mentioned subsurface improvements present an obstruction in locations designated for planting. In such situations, proceed after an alternate location has been approved by the Engineer.

Damages incurred by the Contractor shall be the responsibility of the Contractor to repair in a timely manner to the satisfaction of the Owner.

C. Planting Procedure:

- a. Plant Protection While on Site: Protect plants at all times from sun and drying winds. Plants that cannot be planted immediately on delivery shall be well protected with soil, wet wood chips, or other acceptable material and shall be kept well watered. Plants remaining unplanted for longer than 3 days after delivery may be deemed unacceptable after inspection by Engineer. Plants shall not be bound with wire or rope at time so as to damage the bark or break branches. Plants shall be lifted and handled using suitable support of the ball to avoid damage to the root ball, trunk, or branches.

Plants remaining unplanted for longer than 3 days after delivery may be deemed unacceptable after inspection by Engineer. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled using suitable support of the ball to avoid damage to the root ball, trunk and branches.

- b. Site Preparation: Planting sites shall be prepared in accordance with Section 02000 LANDSCAPE GRADING AND DRAINAGE and Section 02100 SOILS and in accordance with the plans and specifications. No fertilizer should be applied at planting except those nutrients that are required as soil amendments as a part of plant bed preparation.
- c. Locations of Plants: The Contractor shall stake or paint all locations for plants and outlines of areas to be mass planted, and obtain approval of the Engineer before excavation is begun. A minimum of 30% of plant sites must be marked before inspection will be made and plant installation can proceed.
- d. Excavation: No excavation or planting shall be done in soil that, in the opinion of the Engineer, is too wet, too dry or not properly conditioned as provided in these specifications. All excavations shall be in accordance with Typical Planting

Detail Sheet included in plans and contract or as otherwise specified. During working hours the Engineer may designate holes to be barricaded if holes are determined to present a pedestrian hazard.

- e. Detrimental Soil Conditions: The Contractor shall notify the Engineer in writing of all soil and drainage conditions which the Contractor considers detrimental to growth

of plant material. The Contractor shall state in writing the conditions and submit proposal in writing to the Engineer for correcting the condition.

- f. Obstructions: If rock, underground construction work, tree roots, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Engineer. Where locations cannot be changed as determined by the Engineer, remove the obstructions to a depth of not less than 6 inches below the required pit depth. Proceed with work after approval of the Engineer.

D. Plant Installation:

- a. Planting Beds: The extent of the planting bed shall be prepared as indicated on the construction plans and per Section 02100. The plant beds for shrubs, groundcover plants and trees shall be prepared wide enough to accommodate all roots without crowding or twisting. **No unplanted planting pits shall be left open overnight.**

The Contractor shall remove excess soil and dispose of it in a legal manner.

- b. Watering of Plants: The Contractor shall thoroughly water all plants immediately after planting. This entails full and thorough saturation of all backfill in the planting pits and beds during the same day of planting. Apply water at a very low pressure to avoid air pockets and injury to roots. When planted, watered and fully settled, the plants shall be vertical and the top of the root ball shall not be below the existing grade as detailed in 40.01 and 40.06. Fill basin with water, being careful not to break down berm with the hose stream, wash away any mulch or gouge out holes in the backfill.
- c. Pruning: No pruning is allowed except to remove broken branches, street/sidewalk obstructions and for correcting irregularities including removal of soft wood or sucker growth and/or broken or badly bruised branches. Prune with sharp tools and make cuts even and clean. Pruning shall be approved by the City.
- d. Mulch Application: **Within two (2) days after planting, mulch entire shrub beds with a four inch (4") layer of mulching material and all groundcover beds with a 2" layer of mulching material. Do not allow mulch to pile up against the trunk or stems of the plants.**
- e. Name Tag Removal: The Contractor shall not remove name tags attached to installed plants prior to final inspection. The Contractor shall remove all nametags from installed plants at the direction of the City.

- f. Abandoned Plant Pits: When utility lines or other unsuitable subsurface conditions are encountered in plant pits, the Engineer will direct that plants be relocated to other satisfactory locations. The Contractor shall backfill abandoned pits with suitable topsoil to compacted finish grade. Unsuitable material shall be removed from property by Contractor. These areas shall be reseeded as specified in the SEEDING AND SODDING standards. **No planting pits shall be left open overnight.**

E. Final Acceptance:

Upon completion of all planting operations, including cleanup, the Contractor shall notify the Engineer and accompany him or her on inspection of planting. Any items found to be unsatisfactory shall be corrected prior to approval for final acceptance. The one-year warranty period shall begin on the date of final acceptance.

The Contractor shall be responsible for maintenance of plants until final acceptance. This includes, but is not limited to all necessary watering, fertilization based on planting season, weed control and the appropriate applications of fungicides and insecticides necessary to maintain plants free of damaging pests.

Maintenance After Acceptance:

1. Watering: Watering of plant material, including irrigation frequency and duration, shall be the responsibility of the Contractor during the lifetime of the warranty period. Water may be from rainfall or commercial watering or a combination of both. The Contractor shall ensure plants have sufficient water to keep them out of moisture stress but avoid excessive water that will support root rot disease.

Water is to be applied directly to the water basin, inside the berm, for each plant. Using a hose end water breaker, apply water at a very low pressure to avoid injury to the plant roots, destruction of the plant pit water berm, or disturbance of the backfill or mulch.

2. Fertilizer Application: No fertilizer is to be applied at time of planting. Adjustment of nutrient levels and soil acidity shall be done at the time of site preparation according to SOIL Section 2100. Where fertilizer application is required for maintenance of plant health, the fertilizer shall be one of the following listed below or an approved substitute.

Ornamental plant fertilizer	12-4-8	2 lbs/100 sq ft
Ornamental plant fertilizer	10-10-10	2.5 lbs/100 sq ft

Using one of the approved products, apply recommended annual amount in split applications, spring and fall, according to the manufacturer's directions, and in such a manner as to avoid any salt injury to stem or roots of the ornamental plant.

3. Planting Material Replacement:

Through the life of the project and warranty period the contractor shall monitor the project site every thirty days or more often to note dead or unacceptable plant materials by: quantities, varieties, and project locations. Plant loss, removal and replacement information noted through monitoring shall be submitted to the City inspector in writing.

Through the life of the project and warranty period any plant that is dead or not in satisfactory growth, as determined by the Engineer, shall be immediately removed from the site if the Engineer so requests. These and any missing plants shall be replaced as soon as conditions permit, but during the normal planting season. If plant(s) is (are) not removed within five (5) days of written or email notice from Engineer, the City of Charlotte will remove dead plant(s), dispose of it (them), and charge the contractor for the cost of removal and disposal.

Replacement material shall be installed per the following schedule:

- During planting season - When plant material is identified for replacement during the planting season, the material shall be replaced within **ten** working days of notification.
- During non-planting season – When plant material is identified for replacement during non-planting months, the material shall be replaced within the first **thirty** calendar days of the earliest available planting season.

4. Payment: There will be no separate or additional payment for “Establishment of Plant Material and Maintenance”. The cost including but not limited to maintenance, watering fertilizers, fungicides, insecticides, planting material replacement, traffic control and all other related work will be included in the planting material costs.

F. Infrastructure Damage: If the Contractor disturbs the infrastructure, including but not limited to curbs, sidewalks, pavement, signage, plant material, water wells, backfilled and/or mulched areas, through the watering operations or any other maintenance or installation operation, the damage shall be fixed immediately at no cost to the City.

G. Traffic Control: The Contractor shall be responsible for traffic control through the life of the project and warranty period.

H. Cleanup: During the installation, the Contractor will be required to keep all areas clean.

At the time of final inspection of work and before issuance of the final payment, the Contractor shall clean paved areas thoroughly by sweeping and/or washing. Any stains shall be removed.

The Contractor shall remove construction equipment, excess materials, tools, and all debris and rubbish from the site. All dirt and debris shall be legally disposed of by the Contractor.

I. Guarantee and Replacement:

The Contractor shall guarantee all trees and all other materials and workmanship for a period of twelve (12) months from the date of final acceptance by the Engineer. The Contractor shall replace any plants that have more than 1/3 crown dieback or any other portion of the project that fails due to faulty materials or workmanship. All plants shall be insect and/or disease free. Plants damaged by pest activity through the warranty period shall be replaced. A six (6) month and eleven (11) month inspection will be held during the warranty period. Damage prior to final acceptance shall be the responsibility of the Contractor.

Plant replacements shall be the same species as specified in the plant list. Replacement plant sizes shall be the same as other existing plants of the same species on the project. Plants, plant soil mix, fertilizer and mulch etc., shall be replaced as originally specified. Replacement plants are subject to the established inspection process (PART 02B Plant Approval Process).

Through the life of the warranty period any plant that is dead or not in satisfactory growth, as determined by the Engineer, shall be immediately removed from the site. These and any missing plants shall be replaced as soon as conditions permit, but during the normal planting season. If plant(s) is (are) not removed within five (5) days of notice from the Engineer, the City of Charlotte will remove dead plants, dispose of them, and charge the Contractor for the cost of removal and disposal.

Plants and items repaired or replaced shall have an extended warranty period of twelve (12) months from the date of acceptance of the repaired item.

END OF SECTION

Section 04100

TREE PLANTING

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STANDARD DETAILS

<u>Standard No.</u>	<u>Description</u>
40.01	Tree Planting Detail
40.03	Large and Small Maturing Tree Pit with Grate in Sidewalk (Plan)
40.03A	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section)
40.03B	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section)
40.03C	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section)
40.05B	Individual Small Shrub / Tree Planting
40.06	6' Tree Planting Strip UMUD only
40.08A	Median Greater Than 120 inches Excavation, Drainage and Backfill
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40.08C	48 to 72 inch Median Excavation, Drainage and Backfill
40.09	Root Flare Depths (Tree Rootball Conditions on Trees from Suppliers)
40.10	Tree Planting Notes

TREE PLANTING

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

The work required under this Section consists of all preparation, planting and related items necessary to complete the work indicated as described in the Specifications, in addition to the supplying of all plants specified on plant schedule of the design plan.

All planting shall be executed during the planting season (October 15 thru April 15), unless exceptions are made in writing by the Engineer.

All plant species, sizes, forms, shapes and locations will be subject to approval by the Engineer.

C. Payment:

Payment will be made under:

Plant Name.....Ea.

Unit bid price shall include installation and all other specifications and guidelines required per most recent revision of Landscape Management Division's Landscape Construction Standards. Installation includes planting, soil amendments, mulch, staking, watering and warranty.

D. Substitutions:

The species or varieties, materials, products or sizes specified by botanical and common name, shall be provided as specified. Only upon written application by the Contractor to the Engineer, and when such application is approved in writing by the City of Charlotte, will substitutions be permitted. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution. The contractor must submit a list of a minimum of 10 sources of plant suppliers that have been contacted. The list must include the name of the plant supplier, contact name, date and time.

If proof is submitted, substantiated in writing, that any plant specified is not obtainable by the Contractor, the City will attempt to locate the specified plant. If the City is able to locate the specified plant (s), the request for a plant substitution will be denied.

If the specified plant (s) proves to be unavailable, the City of Charlotte will consider the use of a substitute plant.

PART 02 – PRODUCTS

A. Soil:

Soil shall be defined in SOIL Section 02100

B. Plant Material:

Supply all plants as specified in plant list as shown on drawings. Plants shall be typical of their species and variety, have normal growth habits, have well-developed branches, be vigorous, and have fibrous root systems. No plants will be accepted unless they show healthy growth and satisfactory foliage conditions. Size of plants, spread of roots and size of balls shall be in accordance with American Standard for Nursery Stock (ANSI Z60.1, latest revision), as published by the American Association of Nurseryman, Inc. All plants of each particular variety shall be uniform in size and configuration, and shall be labeled with correct plant name and size.

Balled-and-burlap plants shall be nursery grown and freshly dug. Burlap shall be untreated and biodegradable. No plants showing evidence of “made” root balls will be accepted.

Containerized plants shall have a root system sufficient enough in development to hold the soil intact when removed from the container. The root system shall not be root bound (a condition where the root system is dense in mass), excessively intertwined or have an established circular growth pattern.

All trees must be tagged with nursery labels. All patented trees shall have a patent number on tag.

Plant nursery labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process lettering. These nursery labels shall be removed by the Contractor after the final acceptance, at the request of the City of Charlotte. Plants shall conform to measurements specified in the Plant Schedule, except that plants larger than specified may be used if approved by the Engineer. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant in accordance with the American Standards of Nursery Stock.

Shipment and Delivery:

The Contractor shall furnish an itemized list from the plant nursery or grower of the actual species, variety, quantity and sizes.

The Contractor shall deliver the necessary inspection certificates to accompany each plant or shipment prior to acceptance and planting.

When shipment is made by open truck, pack all plant material to provide adequate protection against climate and breakage during transit, and tie to prevent wind-whipping. The tops shall be covered with tarpaulin to minimize wind-whipping and drying.

Exercise care at all times during handling operations to prevent damage to bark, branches, and root system. Employ a suitable method of handling to insure the careful delivery of heavy balled plants to preclude loose or crushed plant balls. All balled and burlap plants shall have wire baskets.

Plants shall be free from defects and injuries, and shall be certified by the State and Federal Departments of Agriculture to be free from plant diseases and insect infestations.

All new trees must have straight trunks with a single leader intact, unless multi-stem trees are specified. Bark shall be free of abrasions, and all cuts shall show callus tissue growth. Trees will not be accepted which have had their branches shortened, leaders cut or which have leaders damaged so that cutting is necessary. Unless otherwise specified, large-maturing trees shall be free of branches up to six feet (6') from top of ball, well-branched, and have straight stems. All pruning cuts on the trunk, which are over one-half inch in diameter, shall have callus tissue formed prior to delivery and inspection. No pruning cut on the trunk shall be more than one-half the diameter of the central leader at the height where the cut is made.

C. Fertilizers:

Fertilizer shall have 30 – 40% of its nitrogen in a slow-release water-soluble form. The chlorine content shall not exceed two percent. The fertilizer ratio of macronutrients shall be approximately 3-1-1, 3-1-2, or 1-1-1 and contain all micronutrients needed for normal plant growth. The actual amount of the chosen product will be adjusted to deliver one-quarter pound of actual nitrogen per 100 square feet of area.

D. Herbicide:

Pre-emergent herbicides to be applied at planting prior to mulch application shall contain the chemical trifluralin, oryzalin or substitute approved by the Engineer.

E. Mulch:

Mulch shall consist of double-hammered hardwood mulch or shredded pine bark mulch as specified on the plans and specifications. All mulches shall be free of any foreign materials, wood pieces larger than 2 inches and/or green wood.

F. Water:

Water shall be free from oil, acids, alkalis, salts or any other substances that are toxic or otherwise harmful to vegetation. Water from an untreated source (e.g. pond or well) must be approved by the Engineer.

PART 03 – EXECUTION

A. Plant Approval Process:

Plant approval is Monday through Friday from 8:00am until 10:30am at the City of Charlotte Landscape Management offices, only. No plant approval shall take place on City of Charlotte holidays.

A representative sample of each plant type shall be submitted to Landscape Management for approval. If a specified plant is obtained from multiple nursery sources, there must be a representative sample submitted from each source used.

Landscape Management will mark each approved representative sample with a numbered acceptance tag. Contractor shall not remove the numbered acceptance tag until requested by the City of Charlotte. Landscape Management will provide written documentation of approval to Contractor's representative for submittal to project inspector.

B. Planting Preparation:

Subsurface Improvements: Observe proper precautions so as not to disturb or damage subsurface improvements.

Contractor is responsible for locating any and all utilities prior to excavation. Prior to excavations, Contractor shall notify North Carolina One-Call Center, Inc. to ascertain locations of electrical cables, conduits, utility lines, oil tanks, supply lines, subsurface drainage, and irrigation lines, etc. Notify the Engineer should the above-mentioned subsurface improvements present an obstruction in locations designated for planting. In such situations, proceed after an alternate location has been approved by the Engineer. Damages incurred by the Contractor shall be the responsibility of the Contractor to repair in a timely manner to the satisfaction of the Owner.

C. Planting Procedure:

a. Plant Protection While on Site:

Protect plants at all times from sun and drying winds. Plants that cannot be planted immediately on delivery shall be well protected with soil, wet wood chips, or other acceptable material and shall be kept well watered. Trees remaining unplanted for

longer than 3 days after delivery may be deemed unacceptable after inspection by Engineer. Trees shall not be bound with wire or rope at any time so as to damage the bark or break branches. Trees shall be lifted and handled using suitable support of the ball to avoid damage to the root ball, trunk and branches.

Before excavations are made, cover the surrounding turf, if existing, in a manner that will satisfactorily protect all turf areas that are to be driven over, and upon which soil is to be temporarily stacked pending its removal or reuse. Barricade existing trees, shrubbery and beds that are to be preserved in a manner that will effectively protect them during planting operations or as specified on the plans.

b. Site Preparation:

Planting sites shall be prepared in accordance with Section 02000 LANDSCAPE GRADING AND DRAINAGE and Section 02100 SOILS and in accordance with the plans and specifications.

No fertilizer should be applied at planting except those nutrients that are required as soil amendments as a part of plant bed preparation. However, if planting individual trees in locations where soil amendments are not required (Type 3 and Type 4 locations of Section 02000 – Landscape Grading, Drainage & Bed Preparation) and the backfill is not a pre-approved soil mix, then the native backfill soil shall be amended with a balanced fertilizer that is thoroughly mixed throughout the backfill soil. Use a starter fertilizer such as 5-10-5, 10-20-20 or 18-24-10 at manufacturer recommended rates. Unless the specific plant species requires a low-acid soil, add dolomitic lime to backfill soil, mixing thoroughly, at a rate of four pounds (eight cups) per cubic yard of soil.

- c. Location of Trees: The Contractor shall stake and paint locations for 100% of trees and obtain approval of the Engineer before excavation begins. The Contractor is required to give the Engineer twenty-four hours notice for inspection of staking. Landscape Management shall provide written documentation of approval to Contractor for submittal to project inspector.
- d. Excavation: No excavation or planting shall be done in soil that, in the opinion of the Engineer, is too wet, too dry or not properly conditioned as described in these specifications. All planting excavations shall be in accordance with Plant Installation Notes, Specifications & Details sheet included in plans and contract or as otherwise specified. During working hours the Engineer may designate holes to be barricaded if holes are determined to present a pedestrian hazard.
- e. Detrimental Soil Conditions: The Contractor shall notify the Engineer in writing of all soil and drainage conditions which the Contractor considers detrimental to growth

of plant material. The Contractor shall state in writing the conditions and submit proposal in writing to the Engineer for correcting the condition.

- f. Obstructions: If rock, underground construction work, tree roots, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Engineer. Where locations cannot be changed as determined by the Engineer, remove the obstructions to a depth of not less than 6 inches below the required pit depth. Proceed with work after approval of the Engineer.

D. Plant Installation:

- a. Planting Beds: The extent of the planting bed shall be prepared as indicated on the construction plans and per Sections 2100 and 2200. The plant beds for shrubs, groundcover plants and trees shall be prepared wide enough to accommodate all roots without crowding or twisting.
- b. Tree Installation: Prepare planting pits with shovels, backhoe or auger. Use of certain equipment may be prohibited in medians with drainage. No vertical pit sides will be allowed. Sides of holes must have at least a 45 degree angle from bottom to top. The Contractor shall thoroughly scarify planting pit sides. This is particularly important if an auger is used.

The planting contractor will frequently have to make adjustments to correct buried root crowns due to the widespread nursery practice of burying the root crown too deeply. Any tree with more than 2" of soil covering the root ball from the nursery will be rejected. (CLS 40.09) Upon completion of planting, the root crown (also called the trunk flare) must be evident within one inch (1") of the surrounding grade level. Any excess soil covering the trunk flare will have to be removed carefully, by hand, in order to prevent scraping of roots. The tree is to be raised so that the trunk flare is in proper relation to the surrounding grade. Do not plant the ball high.

When partially backfilled and compacted, cut away the ball ties. Cut and remove the wire basket, rope, burlap, or other ball wrapping materials from the top one-third (1/3) of the root ball. Cut or adjust to prevent the formation of air pockets. No burlap shall be pulled from under the balls.

Cut or adjust the remaining burlap to prevent the formation of air pockets. No burlap is to be pulled from under the balls.

Backfill one-half of remaining hole. Firm down soil eliminating all air pockets. Water the tree in to settle the soil and eliminate air pockets. Backfill the rest of the hole. Do not pack hard.

Build a four inch high berm around the outside edge of the root ball to form a basin for holding water. The bottom of the basin shall be at surrounding finish grade. Shape the berm to fit the available planting space. Keep soil and mulch off the sidewalk. Water berms may be oval or rectangular, but do not mound soil higher than four inches. Water the tree in to settle the soil and eliminate air pockets.

The Contractor shall remove excess soil and dispose of it in a legal manner.

- c. Watering of Plants: The Contractor shall thoroughly water all plants immediately after planting. This entails full and thorough saturation of all backfill in the planting pits and beds during the same day of planting. Apply water at a very low pressure to avoid air pockets and injury to roots. When planted, watered and fully settled, the plants shall be vertical and the top of the root ball shall not be below the existing grade as detailed in 40.01 and 40.06. Fill basin with water, being careful not to break down berm with the hose stream, wash away any mulch or gouge out holes in the backfill.
- d. Pruning: No pruning is allowed except to remove broken branches, street/sidewalk obstructions and for correcting irregularities including removal of soft wood or sucker growth and/or broken or badly bruised branches. Prune with sharp tools and make cuts even and clean.
- e. Trunk Wrapping and Trunk Protectors: Any wrapping from the nursery to protect the trees in transit shall be left on the trunk until it is planted, and then all tree wrapping must be removed. Brown or gray plastic trunk protectors **may** be installed on all trees in turf areas as directed by the City Arborist/Horticulturist. Do not lock the ends of the trunk protectors together.
- f. Staking: All trees shall be staked per CMLDS detail 40.01 "Tree Planting Detail" unless otherwise directed by the City. Use only 3/4 inch green nylon strap with a slip knot and a stop knot 3 to 6 inches larger than the tree trunk to allow for growth. No cord, rope, wire or hose will be allowed.

If oversized planting pits are specified and the soil is loosened to 18 inches, use stakes long enough to achieve a solid anchor. The Contractor shall be responsible for any necessary adjustments to staking if trees begin to lean.

Where required, wrap or cover straps with fluorescent flagging.

The Contractor shall remove all staking and plastic trunk protectors at the expiration of the one-year warranty period or at the direction of the City.

- g. **Mulch Application:** Within two (2) days after planting, mulch all plant areas, individual tree pits and entire shrub and groundcover beds with a four inch (4") layer of mulching material unless otherwise directed by the City. Taper mulch to ground level at the trunk. Do not allow mulch to pile up against the trunk or stems of the plants.
- h. **Name Tag Removal:** The Contractor shall not remove name tags attached to installed plants prior to final inspection. The Contractor shall remove all nametags from installed plants at the direction of the City.
- i. **Abandoned Plant Pits:** When utility lines or other unsuitable subsurface conditions are encountered in plant pits, the Engineer will direct that plants be relocated to other satisfactory locations. The Contractor shall backfill abandoned pits with suitable topsoil to compacted finish grade. Unsuitable material shall be removed from property by Contractor. These areas shall be reseeded as specified in the SEEDING AND SODDING standards. **No planting pits shall be left open overnight.**

E. Relocation of Trees:

Trees shall be transplanted using appropriate techniques and equipment as specified by current ANSI standards. Trees shall be removed with a root ball sized in proportion to their calipers. Root balls shall be 12" in diameter for each 1" of tree caliper. Trees 4" in caliper and smaller are to be measured 6" from the ground. Trees 4"- 8" in caliper are measured 12" from the ground, trees 8" caliper or larger are measured from breast height.

Trees transplanted off site in full leaf shall be covered entirely with a protective cloth covering prior to transporting. Trees transplanted on site do not require the covering.

Trees which cannot be immediately replanted are to be stockpiled in a location approved by the City. Trees shall be well heeled-in and protected from excessive wind and sun.

Trees shall be installed in their final position according to previously detailed Tree Planting Procedures. The Contractor shall provide water to maintain a healthy condition.

F. Final Acceptance:

Upon completion of all planting operations, including cleanup, the Contractor shall notify the Engineer and accompany him or her on inspection of planting. Any items found to be unsatisfactory shall be corrected prior to approval for final acceptance. The one-year warranty period shall begin on the date of final acceptance.

The Contractor shall be responsible for maintenance of plants until final acceptance. This includes, but is not limited to all necessary watering, fertilization based on planting season, weed control and the appropriate applications of fungicides and insecticides necessary to maintain plants free of damaging pests.

After Acceptance Maintenance:

1. Watering: Watering of plant material, including irrigation frequency and duration, shall be the responsibility of the Contractor during the lifetime of the warranty period. Water may be from rainfall or commercial watering or a combination of both. The Contractor shall ensure plants have sufficient water to keep them out of moisture stress but avoid excessive water that will cause root rot disease.

Water is to be applied directly to the water basin, inside the berm, for each plant. Using a hose end water breaker, apply water at a very low pressure to avoid injury to the plant roots, destruction of the plant pit water berm, or disturbance of the backfill or mulch.

2. Fertilizer Application: No fertilizer is to be applied at time of planting. Adjustment of nutrient levels and soil acidity shall be done at the time of site preparation according to SOIL Section 2100. Where fertilizer application is required for maintenance of plant health, the fertilizer shall be one of the following listed below or an approved substitute.

Ornamental plant fertilizer	12-4-8	2 lbs/100 sq ft
Ornamental plant fertilizer	10-10-10	2.5 lbs/100 sq ft

Using one of the approved products, apply recommended annual amount in split applications, spring and fall, according to the manufacturer's directions, and in such a manner as to avoid any salt injury to stem or roots of the ornamental plant.

3. Planting Material Replacement:

Through the life of the project and warranty period the contractor shall monitor the project site every thirty days or more often to note dead or unacceptable plant materials by: quantities, varieties, and project locations. Plant loss, removal and replacement information noted through monitoring shall be submitted to the City inspector in writing.

Through the life of the project and warranty period any plant that is dead or not in satisfactory growth, as determined by the Engineer, shall be immediately removed from the site if the Engineer so requests. These and any missing plants shall be replaced as soon as conditions permit, but during the normal planting season. If plant(s) is (are) not removed within five (5) days of written or email notice from Engineer, the City of

Charlotte will remove dead plant(s), dispose of it (them), and charge the contractor for the cost of removal and disposal.

Replacement material shall be installed per the following schedule:

- During planting season - When plant material is identified for replacement during the planting season, the material shall be replaced within **ten** working days of notification.
- During non-planting season – When plant material is identified for replacement during non-planting months, the material shall be replaced within the first **thirty calendar** days of the earliest available planting season.

4. Payment: There will be no separate or additional payment for “Establishment of Plant Material and Maintenance”. The cost including but not limited to maintenance, watering fertilizers, fungicides, insecticides, planting material replacement, traffic control and all other related work will be included in the planting material costs.

- G. Infrastructure Damage: If the Contractor disturbs the infrastructure, including but not limited to curbs, sidewalks, pavement, signage, plant material, water wells, backfilled and/or mulched areas, through the watering operations or any other maintenance or installation operation, the damage shall be fixed immediately at no cost to the City.

- H. Traffic Control: The Contractor shall be responsible for traffic control through the life of the project and warranty period.

- I. Cleanup: During the installation, the Contractor will be required to keep all areas clean.

At the time of final inspection of work and before issuance of the final payment, the Contractor shall clean paved areas thoroughly by sweeping and/or washing. Any stains shall be removed.

The Contractor shall remove construction equipment, excess materials, tools, and all debris and rubbish from the site. All dirt and debris shall be legally disposed of by the Contractor.

- J. Guarantee and Replacement:

The Contractor shall guarantee all trees and all other materials and workmanship for a period of twelve (12) months from the date of final acceptance by the Engineer. The Contractor shall replace any tree that has more than 1/3 crown dieback, or dieback of the central leader, or dieback of any portion of the tree that interferes with satisfactory growth or health. The Contractor shall replace any other portion of the project that fails due to faulty materials or workmanship. All plants shall be insect and/or disease free. Plants damaged by pest activity through the warranty period shall be replaced.

A six (6) month and eleven (11) month inspection will be held during the warranty period. Damage that occurs prior to final acceptance shall be the responsibility of the Contractor.

Plant replacements shall be the same species as specified in the plant list. Replacement tree sizes shall be the same as other existing trees of the same species on the project. Trees, plants, plant soil mix, fertilizer and mulch etc., shall be replaced as originally specified. Replacement trees and plants are subject to the established inspection process (PART 02B Plant Approval Process).

Through the life of the warranty period any tree that is dead or not in satisfactory growth, as determined by the Engineer, shall be immediately removed from the site. These and any missing trees shall be replaced as soon as conditions permit, but during the normal planting season. If tree(s) is (are) not removed within five (5) days of notice from the Engineer, the City of Charlotte will remove dead trees, dispose of them, and charge the Contractor for the cost of removal and disposal.

Any tree(s) and items repaired or replaced shall have an extended warranty period of twelve (12) months from the date of acceptance of the repaired or replaced item.

END OF SECTION

Section 04200

SEEDING AND SODDING OF TURFGRASS

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STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
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SEEDING AND SODDING OF TURFGRASS

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

Seeding and sodding of new areas.

C. Substitutions:

The species or varieties, materials, products or sizes specified herein by botanical and common name, shall be provided as specified. Substitutions will be permitted only upon written application by the Contractor to the Engineer, and when approved by said Engineer in writing. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution.

PART 02 – PRODUCTS

A. Soil:

Soil shall be defined in SOIL Section 02100

B. Soil Amendments: shall be applied in accordance with soil test results.

Lime:

Lime shall be pelletized dolomitic limestone that meets NCDA standards for particle sizes. All lime shall be uniform in composition, dry, free flowing and shall be delivered to the site in the original unopened container, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged will not be accepted.

Fertilizers:

Commercial fertilizer applied at seeding/sodding time shall be a slow release starter fertilizer. All fertilizer shall be uniform in composition, dry, free flowing and shall be delivered to the site in the original unopened container, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged will not be accepted.

C. Seed:

Grass seed for urban landscape plantings shall be a blend of two or more varieties of turf-type tall fescues as specified on plans or approved by the Engineer. Seed selection shall be approved by the City.

All seed shall have a 98% minimum purity, 85% minimum germination, and be free of noxious weed seeds, as certified by the North Carolina Co-op Improvement Association or its approved equivalent by the Engineer. Seed shall be delivered to the site in sealed standard size containers, showing weight, analysis, name of vendor and germination test. Seed, which has become wet, moldy, over one year old, or otherwise damaged, will not be accepted.

D. Temporary Seed

At the approval of the Engineer, in order to provide a more rapid and more dependable cover for temporary site stabilization during months outside of the recommended seeding schedule for turf-type tall fescue (Part 03- A3.), a temporary seed mix may be used. German millet or brown-top millet may be used as a temporary seed from May 1 to August 15 or as directed by Engineer. Rye grain may be used as a temporary seed from October 25 through December 30 or as directed by Engineer. The use of temporary seeding will require that permanent seeding be placed between August 25th and October 15th or February 15th and April 15th. Permanent seeding shall include all necessary seed bed preparation "prescribed by soil test", fertilizing, watering, etc. in order to ensure 90% coverage of the required vegetation.

E. Protective Organic Mulch:

Mulch shall be clean threshed wheat or oat straw from the latest available harvest crop and shall be free of noxious weed seeds and foreign material. Any substitutions shall be approved by the Engineer.

F. Turf Grass Sod: Variety of sod, where shown, shall be as specified on plan. Otherwise, shall be approved by the Engineer. Sod shall be two years old with a minimum thickness of 5/8 inch plus thickness of top growth and thatch.

PART 03 – EXECUTION

A. Turf and Lawn Seeding:

Establishment:

1. Soil Testing: Testing results shall be provided by contractor prior to installation of crop. Based on soil tests results and direction of engineer, deficiencies shall be corrected by the Contractor. Any sample for approval will be the contractor's or vendor's responsibility and must be tested by a reputable soil testing lab.

2. Preparation of Seed Bed: Unless otherwise approved by the City, all other site work required by this contract shall be complete and in place before grassing operations are begun. Work may be completed in parts if so requested by the Contractor and approved by the City. Prior to seeding operations, all proposed lawn areas shall be scarified/tilled to 6" depth and prepared until the surface is smooth, friable and of a uniformly fine texture. Remove stones and foreign material over one inch in diameter and grade for positive drainage as required to prevent ponding of water. After fine grading /raking, the soil shall be firmed so that the soil surface shall bear the weight of a person and not form a depression in excess of one (1) inch.

Lime, soil additives and starter fertilizer shall be broadcasted and worked into the soil uniformly during tillage at all areas at the rate dictated by the soil test that will provide a PH level of 6.5 to 7.0

3. Seeding: If seeding, the following schedule is recommended:

Turf-type Fescue	Fall:	August 25 – October 15
	Spring:	February 15 – April 15

Turf-type fescue may be seeded year-round; however, any variance in the above seeding schedule will require at least one over-seeding application from August 25th to October 31 to ensure 90% coverage. This over-seeding is considered incidental and there shall be no separate measurement or payment for over-seeding and shall be done in conjunction with core aeration

Written requests for a variance must approved by the Engineer

Apply turf-type fescue at the manufactures recommended rate or minimum of six (6) lbs. per 1000 square ft.

If specified, apply Bermudagrass at the manufacturer's recommended rate, or minimum of one (1)) lb per 1000 square ft. and timed as directed by engineer.

Organic lawn mulch shall be spread uniformly.

B. Sodded Areas

Establishment:

1. Soil Testing: Testing results shall be provided by contractor prior to installation of crop. Based on soil tests results and direction of engineer, deficiencies shall be corrected by the Contractor. Any sample for approval will be the contractor's or vendor's responsibility and must be tested by a reputable soil testing lab.

2. Preparation of Planting Bed: Unless otherwise approved by the City, all other site work required by this contract shall be complete and in place before sodding operations begin. Work may be completed in parts if so requested by the Contractor and approved by the City. Prior to sodding operations, all proposed lawn areas shall be tilled/scarified to 6" depth and prepared until the surface is smooth, friable and of a uniformly fine texture. Remove stones and foreign material over one inch in diameter and grade for positive drainage as required to prevent ponding of water. After fine grading /raking, the soil shall be firmed so that the soil surface shall bear the weight of a person and not form a depression in excess of one (1) inch.

3. Sod Planting: Prepare sub-grade as specified above. Allow for thickness of sod to finished grade. Lay sod within 24 hours from time of stripping. Protect any sod stored on site from damage. Do not lay sod on frozen ground. Soil should be moist, but not wet, prior to laying sod. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. After installation ensure contact with soil. Work sifted soil into minor cracks between pieces of sod, and remove excess to avoid smothering of adjacent grass. Anchor sod on slopes to prevent slippage. Lay sod perpendicular to slope directions.

C. Maintenance / Establishment of New Grass & Sod:

Prior to acceptance:

The Contractor shall be responsible for all maintenance of turf and facilities until final acceptance. This includes all necessary watering, application of appropriate fertilizer, based on planting season, and the appropriate application of fungicides and insecticides necessary to maintain turf free from disease and insect activity.

1. Seeded Areas: Maintenance of seeded areas shall consist of fertilization, erosion repair, reseeding and incidental operations as necessary to establish a vigorous, healthy and uniform stand of specified grass. All areas that fail to show a uniform stand of grass for any reason shall be treated properly until a uniform stand of at least 90% coverage is attained with no bare areas.

Grass mowing operations shall be performed by the Contractor until final acceptance of the work. Trash and debris shall be removed prior to mowing. Mowing shall be performed only when the grass is dry. No more than 1/3 leaf blade shall be removed at each mowing. Turf Type Tall Fescue shall be maintained at a 3.5 to 4 inch height. Bermuda shall be maintained at a height of 1.5 -2 inches. All maintenance performed prior to acceptance shall be considered incidental to the project and no separate payment shall be made.

Watering Seeded Areas: It shall be the responsibility of the Contractor to manage a watering program that results in a stand of turf that meets the guarantee requirement of these standards. It shall be the Contractor's responsibility to decide the irrigation duration and frequency, based on weather and soil conditions that produce the required results.

Fertilizer Top Dressing Follow up fertilization shall be done as per manufacturer's recommended rates.

2. Sodded Areas: Contractor shall maintain sodded areas as follows:

Watering: Water sod immediately after installation. Soak sod thoroughly enough to penetrate soil below the newly installed sod. It shall be the responsibility of the Contractor to manage a watering program that results in a stand of turf that meets the guarantee requirement of these standards. It shall be the Contractor's responsibility to decide the irrigation duration and frequency, based on weather and soil conditions that produce the required results.

In the event the project is accepted prior to the watering requirements being fulfilled, the Contractor will be required to provide water up to 90 days after sodding.

Fertilizer Top Dressing: Follow up fertilization shall be done as per manufacturer's recommended rates.

Mowing: Grass mowing operations shall be performed by the Contractor until final acceptance of the work. Trash and debris shall be removed prior to mowing. Mowing shall be performed only when the grass is dry. No more than 1/3 leaf blade shall be removed at each mowing. Maintain Turf Type Tall Fescue to a height of 3.5" to 4" and Bermuda to a height of 1" to 2". All maintenance performed prior to acceptance shall be considered incidental to the project and no separate payment shall be made.

At Final Acceptance: Upon completion of all seeding and sodding operations, including cleanup, the Contractor shall notify the Engineer and accompany him or her on inspection of plantings. Any items found to be unsatisfactory shall be corrected prior to approval of final acceptance. The one-year warranty period shall begin at the date of the final acceptance.

D. Guarantee and Replacement:

The Contractor shall guarantee all plantings (seeding and sod) and all other materials and workmanship for a period of twelve (12) months for the date of final acceptance by the Engineer. The Contractor shall over-seed or re-establish, at the discretion of the Engineer, any seeded or sodded areas that does not have living plants producing ground coverage of 90% or more of the grass or plant species or combination of species required to be established.

Any time during the 12-month guarantee period that the Engineer determines that the seeding or sodding work has not meet specifications or is not meeting the requirements of these standards, the Contractor will take action within 30 days, or at the next planting season, to replace or reseed these under-performing areas.

END OF SECTION

Section 04300

PRUNING AND REMOVAL OF ESTABLISHED TREES

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STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
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SECTION 04300- PRUNING AND REMOVAL OF ESTABLISHED TREES

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Definitions: See page 2: Definition of Terms

C. Description of Work:

Work Included in this Section:

Provide all supervision, labor, tools, equipment, services and expertise required to perform tree maintenance work as specified herein. Where extent of pruning is not quantified in the construction drawings, bids shall be based on unit prices and extent of pruning will be field determined after the award of contract.

Related Work Specified Elsewhere:

Tree Planting (04100)

Tree Preservation and Protection (Section 01000)

Fertilization of Existing Trees (04400)

D. Quality Assurance:

Bidding on this contract shall be limited to individuals, partnerships and corporations actively engaged in the field of arboriculture. Bidders shall derive a majority of income from arboriculture work. Bidders shall demonstrate competence, experience, and financial capability to carry out the terms of this contract. Work shall be directly supervised by an ISA Certified Arborist. The City may require proof of these qualifications.

PART 02 – PRODUCTS

- A. All bidders must have in their possession or available to them by formal agreement at the time of bidding, trucks, devices, chippers, stump grinders, hand tools, aerial and other equipment and supplies which are necessary to perform the work as outlined in these specifications.

PART 03 – EXECUTION

A. Safety Standards:

All equipment to be used and all work to be performed must be in full compliance with the most current revision of American National Standards Institute, Standard Z-133.1 (Safety Requirements for Pruning, Trimming, Repairing, Maintaining, Removing Trees and for Cutting Brush). These standards are made part of this contract by this reference.

The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall provide the necessary warning devices, barricades and ground personnel needed to give safety protection, and warning to persons and vehicular traffic within the area.

Blocking of public streets shall not be permitted unless prior arrangements have been made to the City and is coordinated with appropriate departments. Traffic control is the responsibility of the Contractor and shall be accomplished in conformance with State, County and Local highway construction codes.

B. Cleanup:

All debris from tree trimming, tree removal, and stumping operations shall be cleaned up each day before the work crew leaves the site, unless permission is given by the City to do otherwise. All lawn areas shall be raked, all streets and sidewalks shall be swept, and all brush, branches and logs shall be removed from the site. Areas are to be left in a condition equal to that which existed prior to the commencement of arboricultural operations. It shall be the responsibility of the Contractor to remove and to dispose in the proper and acceptable manner all logs, brush, and debris resulting from the tree maintenance operation at no additional cost to the City.

C. Supervision:

This contract will be under the direct supervision of the City or its authorized representatives. Any alterations or modifications of the work performed under this contract shall be made only by written agreement between the Contractor and the City authorized representatives and shall be made prior to commencement of the altered or modified work. No claims for any extra time, work or materials shall be allowed unless covered by written agreement.

D. Work Crew Supervision:

The Contractor shall provide qualified supervision of each crew at all times while working under this contract. Each supervisor shall be authorized by the Contractor to accept and act upon all directives issued by the City. Failure for the supervisor to act on

said directives shall be sufficient cause to give notice that the Contractor is in default of the contract unless directives would create potential personal inquiry of safety hazards.

E. Small Tree Pruning:

Objectives for small tree pruning may include canopy elevation, dead limb removal, pruning for structure, sanitation, etc.

F. Large Tree Pruning:

Cutting back or topping shall not be permitted. Pruning will be done under the supervision of an ISA Certified Arborist. The American National Standards Institute A300 Standards for Tree Care Operations, Part I- Tree, Shrub and Other Woody Plant Maintenance – Standard Practices (Pruning) and the companion publication “Tree Pruning Best Management Practices” published by the International Society of Arboriculture (www.isa-arbor.com) shall guide all pruning performed by the City and be made a part of these specifications.

Elevation pruning to provide for pedestrian and vehicular clearance shall be done to provide clearance as directed by the City.

Pruning is to be performed by tree workers who, though related training and on the job experience, are familiar with the techniques and hazards of this work including trimming, maintenance, repairing or removal, and equipment used in such operations. The use of climbing spurs or irons is not approved in pruning operations on live trees. This type of work is a potentially hazardous occupation and is to be undertaken only by trained personnel or under the supervision of trained personnel, all of whom are covered with workers compensation, property damage, public liability, and completed operations insurance.

Cleaning pruning shall consist of the removal of dead, dying, diseased, interfering and weak and broken branches throughout the canopy, which are of diameter of one inch or greater.

The following specification shall apply:

All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts with sharp tools shall be made at all times. All cuts at the trunk are to be made with a pruning saw or chainsaw. Heading back large limbs may be done with loppers, pole pruners, or power equipment.

When branches are too heavy to handle, to prevent slipping or peeling of bark, it is necessary to precut these branches. Where necessary to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.

On trees known to be diseased, tools are to be disinfected with a 20% Clorox solution after each cut and between trees, where there is known to be a danger of transmitting the disease to the tool.

All branches are to cut back to a live lateral, which shall be at least 1/3 diameter of the severed branch. Heading back limbs as part of tree trimming pruning is accepted.

All girdling roots visible to the naked eye are to be reported to a supervisor and/or the Owner.

The presence of any structural weaknesses, disease condition, decayed trunk or branches, split crotches or branches, should be reported in writing to a supervisor and/or the Owner.

All stubs not callusing shall be pruned in the same manner as outlined above in this section. Care shall be taken so as to not damage the callusing tissue. Topping of trees shall not be permitted.

G. Tree Removal:

Trees shall be removed in accordance with accepted industry standards and procedures and in accordance with the following minimum requirements.

Extreme care shall be taken so as to prevent limbs, branches, and trunks from falling and creating damage to adjacent homes, driveways, sidewalks, trees, shrubs, streets and other property, both public and private.

Debris and logs shall not be left on the public right-of-way overnight. It shall be the responsibility of the Contractor to remove and dispose of in a proper and acceptable manner all logs, brush, and debris resulting from the tree removal operation unless otherwise directed by the City. Removal of such debris shall be performed daily so as to not disrupt the work of the Contractors on the site.

H. Stump Grinding:

A. Work shall include, but not limited to, all labor, equipment, and materials necessary to grind all stumps identified in the contract and those identified in the field by the Engineer.

1. All exposed portions of the stump (including root flair) shall be ground to a depth of 12 inches below the surrounding average grade, except in road planting

strips and medians where stumps shall be ground to a minimum depth of 24 inches.

2. Grindings shall be moved back into the hole created by the stump grinding work until the grindings reach a height of 2" to 4" above the surrounding grade. Any surplus grindings shall be removed from the site and disposed of in a proper and legal manner.

B. Measurement:

The stump grinding measurement will be the length measurement of the root flare added to the width measurement of the root flare and divided by two. All measurements will be in inches. There will be no other measurement for payment. The Engineer will determine the measurement for payment at each location.

END OF SECTION

Section 04400

FERTILIZATION OF ESTABLISHED TREES

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	PRODUCTS -	Fertilizer Criteria
Page 5	EXECUTION	Subsurface Application – Liquid Surface Application - Liquid Surface Application - Granular

STANDARD DETAILS

<u>Standard Number</u>	<u>Title</u>
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SECTION 04400- FERTILIZATION OF ESTABLISHED TREES

PART 01 – GENERAL

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Work Included in this Section:

Provide all supervision, labor, tools, equipment, and materials necessary to fertilize existing trees to remain as designated on the plans.

Related Work Specified Elsewhere:

Tree Planting (Section 04100)

Pruning and Removal of Existing Trees (Section 04300)

C. Quality Assurance:

Provider of this service shall be individuals, partnership or corporation actively engaged in arboriculture, horticulture, or a related field.

Contractor shall have in his possession or available by formal agreement at the time of bidding, all equipment and supplies necessary to perform the work specified.

PART 02 – PRODUCTS

- A. The actual product and rate of the product shall be determined by a soil test report and the management goal for the tree(s). If soil test results are not available, fertilizers shall be the an approximate ratio of 3-1-1, 3-1-2 or 2-1-1. Rates should be applied to deliver three pounds of actual nitrogen per 1000 square feet of fertilization area unless management goals dictate a higher or lower rate of nitrogen.
- B. A minimum of 50% of all nitrogen shall be slow release by means of organic breakdown.
- C. All fertilizer shall be manufactured such that it can be applied in the fashion described.

PART 03 – EXECUTION

A. Subsurface Application:

- a. Where subsurface application is required, installation of the fertilizer will be by the pressurized soil injection method. A hydraulic pump capable of delivering a suspension fertilizer with water as a carrier (with the ability to pump the material at the pressure of 150 psi) will be utilized. A soil spear designed for fertilizing application will be used.
- b. Injection of the fertilizer shall start two to three feet from the root flare and injections thereafter, be on a two- to three-foot injection pattern continuously to the dripline or to a radius of one foot per inch of trunk DBH, whichever is greatest.
- c. Injection will be 8 to 12 inches deep.
- d. Soil must be moist prior to application

B. Surface Application (Liquid):

- a. Where liquid surface application is required, a hydraulic pump capable of suspending and delivering a suspension fertilizer with water as a carrier at a low volume will be utilized. To achieve an even distribution of the fertilizer, a flooding tip or water breaker nozzle is required.
- b. Application shall be made evenly from the trunk to the dripline or a radius of one foot per inch of trunk DBH, whichever is greatest.

C. Surface Application (Dry Granular):

- a. When dry granular fertilizer is required, it shall be applied using a rotary or drop spreader, either carried or wheeled configuration so that the required amount of the product is evenly distributed from the trunk to the dripline or a radius of one foot per inch of trunk DBH, whichever is greatest.
- b. To insure an even distribution, application shall be made in two passes at right angles to each other applying half the recommended product rate at each pass.
- c. Application shall be made when rainfall of one-quarter inch or more is expected within 24 hours or irrigation can be utilized within 24 hours.

END OF SECTION



Landscape Management

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